

CLAIMS

WHAT IS CLAIMED IS:

1. A fiber optic communication system, comprising:
a first optical discriminator positioned to convert a first partially frequency modulated signal of wavelength λ_1 into a first substantially amplitude modulated signal and to reflect a multiplicity of multiplexed signals with wavelengths $\lambda_2, \dots, \lambda_n$, which are different from λ_1 , so that the first substantially amplitude modulated signal of wavelength λ_1 and the multiplicity of multiplexed wavelengths $\lambda_2, \dots, \lambda_n$ are made to propagate in substantially the same direction to form a wavelength multiplexed signal with wavelengths $\lambda_1, \lambda_2, \dots, \lambda_n$.
2. The system according to claim 1, in which the multiplexed signals with wavelengths $\lambda_1, \dots, \lambda_n$, are generated by another multiplicity of fiber optic system.
3. The system according to claim 1, where the optical discriminator is adapted to reflect a portion of the partially frequency modulated signal to produce a reflected signal that is used to wavelength lock the partially frequency modulated signal.
4. The system according to claim 3, further including a wavelength locking circuit adapted to wavelength lock the partially frequency modulated signal by comparing a first optical power of the partially frequency modulated signal to a second optical power of the reflected signal and then adjusting the partially frequency modulated signal to keep the ratio of the partially frequency modulated signal to the reflected signal substantially constant.
5. The system according to claim 1, where the first optical discriminator partially compensates for dispersion in a transmission cable.
6. The system according to claim 1, further including a laser source to provide the first partially frequency modulated signal of wavelength λ_1 , and an optical isolator between the laser source and the first optical discriminator.

7. The system according to claim 1, the optical discriminators are each coupled multicavity filters.
8. The system according to claim 1, the optical discriminators are formed from a stack of thin materials having different dielectric constants.
9. The system according to claim 1, where the modulating signal is non-return to zero.
10. The system according to claim 1, where the modulating signal is return to zero.
11. The system according to claim 1, where the modulating signal is sinusoidal RF signal.
12. A fiber optic communication system, comprising:
 - a first optical discriminator adapted to convert a first partially frequency modulated signal into a first substantially amplitude modulated signal;
 - a second optical discriminator adapted to convert a second partially frequency modulated signal into a second substantially amplitude modulated signal and to reflect the first substantially amplitude modulated signal so that the first substantially amplitude modulated signal and the second substantially amplitude modulated signal are substantially in the same direction to form a first wavelength multiplexed signal.
13. The system according to claim 12, further including a first wavelength locking circuit adapted to wavelength lock the first partially frequency modulated signal by comparing a first optical power against a second optical power of the reflected signal of the first partially frequency modulated signal and then adjusting the first partially frequency modulated signal to keep the ratio of the first partially frequency modulated signal to the reflected signal substantially constant.
14. The system according to claim 13, further including:
 - A third optical discriminator adapted to convert a third partially frequency modulated signal into a third substantially amplitude modulated signal and to reflect the first wavelength

multiplexed signal so that the third substantially amplitude modulated signal and the first wavelength multiplexed signal are substantially in the same direction to form a second wavelength multiplexed signal.

15. The system according to claim 14, where the third optical discriminator is adapted to reflect a portion of the third partially frequency modulated signal to produce a third reflected signal which is used to wavelength lock the third partially frequency modulated signal.

16. The system according to claim 12, further including a laser source to provide the first partially frequency modulated signal, and an optical isolator between the laser source and the first optical discriminator.

17. The system according to claim 16, where the laser source is a semiconductor laser diode.

18. A fiber optic system capable of multiplexing, the system comprising:

- a first laser source capable of transmitting a first partially frequency modulated (FM) laser signal;

- a first optical discriminator adapted to convert a first partially FM laser signal into a first substantially amplitude modulated (AM) laser signal;

- a second laser source capable of transmitting a second partially FM laser signal, where the wavelength of the first partially FM laser signal is different from the wavelength of the second partially FM laser signal; and

- a second optical discriminator positioned relative to the first and second laser sources such that the optical discriminator converts the second partially FM laser signal to a second substantially AM laser signal and reflect the first substantially AM laser signal so that the first and second substantially AM laser signals propagate in substantially the same direction to form a first wavelength multiplexed laser signal.

19. The system according to claim 18, further including a wavelength locking circuit adapted to wavelength lock the first partially FM laser signal by comparing a first optical power of the partially FM laser signal to a second optical power of the reflected signal and then adjusting the

partially FM laser signal to keep the ratio of the partially FM laser signal to the reflected signal substantially constant.

20. The system according to claim 19, where the first laser source is coupled to a laser cooler, if the second optical power of the reflected signal increases relative to the first optical power, then cooling the laser cooler to shift the wavelength of the first substantially AM laser signal to be shorter.

21. The system according to claim 19, where the first optical discriminator is coupled to a discriminator cooler to fix the temperature of the discriminator to minimize wavelength drift.

22. A fiber optic communication system, comprising:

means for providing a first partially frequency modulated (FM) laser signal that is different from the wavelength of a second partially FM laser signal;

means for converting the first and second partially FM laser signal to respective first and second amplitude modulated (AM) laser signals;

means for multiplexing the first and second partially AM laser signals to propagate in substantially the same direction.

23. A method for multiplexing at least two signals, the method comprising:

converting a first partially frequency modulated (FM) laser signal to a first substantially amplitude modulated (AM) laser signal; and

reflecting the first substantially AM laser signal in substantially the same direction as multiplexed laser signals with different wavelengths as the wavelength of the first substantially AM laser signal.

24. The method according to claim 23, further including:

cooling the first substantially AM laser signal to shorten its wavelength to decrease the power of the laser from the step of reflecting.